

SPRING DEVELOPMENT

(No.)
Code 574

Natural Resources Conservation Service
Conservation Practice Standard

I. Definition

Utilizing springs and seeps to provide water for a conservation need.

II. Purposes

This practice may be applied as part of a resource management system to support one or more of the following purposes:

- Improve the distribution of water.
- Increase the quantity and quality of water for livestock, wildlife, or other uses.
- Obtain water for irrigation if water is available in a suitable quantity and quality.

III. Conditions Where Practice Applies

This standard applies in areas where spring or seep development will provide a dependable supply of suitable water for the planned times of use, and where the intended purpose can be achieved by using this practice alone or combined with other conservation practices.

IV. Federal, State, and Local Laws

Users of this standard should be aware of potentially applicable federal, state and local laws, rules, regulations or permit requirements governing spring development. This standard does not contain the text of federal, state or local laws.

V. Criteria

A. Investigation

A thorough investigation of the site conditions, including soil borings, and the spring's source shall be made to determine its dependability, quantity of flow, and quality of water. The location for storage facilities shall be determined if needed. Impacts to existing wetland functions shall be assessed and protective measures incorporated into the design.

B. Fracture and Tubular Springs

This type of spring is associated with cavernous rock. If water issues from rock fractures, the individual openings shall be cleaned and enlarged, as needed, to provide an increase in flow. The water from these individual openings shall be collected and conveyed to a central sump or spring box by means of a tile or perforated pipeline or by a gravel-filled ditch. The collection works shall be constructed an adequate distance below the elevation of the openings to permit free discharge.

If water issues from a single opening, such as a solution channel in a soluble rock formation, the opening shall be cleaned or enlarged, as needed. A collection system usually is not required, but a spring box or a sump shall be installed at an elevation sufficiently low that water will not pond over the spring opening to a depth that will materially reduce the yield.

C. Perched or Contact Springs

Perched or contact springs occur where an impermeable layer outcrops beneath a water-bearing permeable layer. These springs shall be developed by intercepting and collecting the flow from the water-bearing formation. Collection trenches shall be used for developing these types of springs.

D. Artesian Springs

Artesian springs normally occur at a fissure or break in the impervious stratum with the water source being an underlying pervious layer. Artesian springs shall be developed by removing obstructions, cleaning or enlarging joints or fractures, or by lowering the outlet elevation to improve flow. Sumps or spring boxes shall be located to hold ponding over the spring outlet to a minimum. Free outlet discharge or minimum restriction of the spring flow is required to maintain water yield.

E. Collection Systems

If a collection trench along the outcrop of the water-bearing formation is to be used, the trench shall be excavated so that it extends into the impervious layer. Minimum length of the trench shall be based on site conditions, preferably the entire length of the water-bearing outcrop.

An impervious cutoff wall of well-tamped clay, masonry, concrete, or other suitable materials shall be constructed along the downstream side of the trench if needed to insure that the flow enters the collection system.

The collection system shall consist of subsurface drainage tubing or perforated pipe not less than 4 inches in diameter, or of a wood box drain enclosed in a geotextile fabric or a sand-gravel filter. A clean crushed rock or gravel backfill, not less than 12 inches thick, may be used as a collection system.

F. Spring Boxes

Spring boxes, if needed, shall be plastic, concrete or other durable material and shall have a tight, removable cover and impervious floor. The floor may be omitted when the underlying material is stable and impervious.

The boxes shall have a minimum cross sectional area of 1½ square feet. The floor of the spring box shall be not less than 6 inches below the outlet of the collection system.

Spring boxes for perched springs shall be floored with concrete unless the underlying material is solid rock or other stable impervious material.

G. Outlets

The outlet pipe from a spring box shall be placed not less than 6 inches above the floor, to provide a sediment trap. The spring outlet pipe should be at the same elevation or lower than the collector pipe outlet to prevent reduced spring flow. The

intake to the outlet pipe shall be screened as necessary, and installed to the box with a watertight connection.

The outlet pipe must have positive grade away from the spring box or collection system unless vent pipes are added to prevent air locks.

The outlet pipe shall have minimum 1-1/4 inch diameter. In lieu of site-specific spring flow and pipe vent calculations, the outlet pipe shall have the following minimum size based on line grades:

1. 1¼ inches inside diameter for line grades greater than 1.0 percent.
2. 1½ inches inside diameter for line grades greater than or equal to 0.5 percent but less than or equal to 1.0 percent.
3. 2 inches inside diameter for lines grades less than 0.5 percent.

Minimum outlet pipe material and strength requirements shall equal those found in NRCS Field Office Technical Guide (FOTG) Section IV, Standard 516, Pipeline.

Overflow pipes shall discharge a sufficient distance from water tanks so as not to create undesirable conditions around the tank.

H. Appurtenance Protection

Measures shall be included to protect appurtenances from damage by freezing, flooding, sedimentation, contamination, vehicular traffic, and livestock.

I. Wildlife Habitat Protection

Spring developments with potential to jeopardize wetlands, bogs, fens, or other unique ecological sites shall be designed with measures required to maintain the existing habitat. A functional assessment will be made at potential spring development areas to determine existing ecological functions and/or potential losses.

Operation and maintenance plans for ecologically sensitive sites shall include specific valve installation and operation requirements to protect existing site habitat values.

J. Vegetation Establishment

Establishing vegetation on disturbed areas shall be in accordance with NRCS FOTG Standard 342, Critical Area Planting.

VI. Considerations

Additional recommendations relating to design that may enhance the use of, or avoid problems with, this practice but are not required to ensure its basic conservation functions are as follows:

- A. Potential effects when considering the suitability of a site for development shall include the need and feasibility of protection from flooding, sedimentation and contaminants, and potential damage to cultural resource areas, wetlands, woody cover, and existing wildlife habitat.
- B. A shutoff valve and vent system on the spring outlet pipe should be considered for winter shutdown, flow control, and maintenance.
- C. Native vegetation adapted to wet conditions may be used as an alternative to introduced grasses on some wet sites.

VII. Plans and Specifications

Plans and specifications for installing spring developments shall be in keeping with this standard and shall describe the requirements for applying the practice to achieve its intended purpose.

VIII. Operation and Maintenance

The operation and maintenance plan shall include such items as winter freeze and flooding protection, overflow and valve operations, spring box sediment removal, rodent damage repair, maintaining vegetative cover and stable outlet, and other site specific items as needed.

IX. References

National Engineering Handbook Part 650,
Engineering Field Handbook, Chapter 12, Springs
and Wells.

USDA, NRCS General Manual 190 Part 410.

USDA, NRCS Wisconsin Field Office Technical
Guide, Section IV, Conservation Practice Standards
and Specifications.